

Qualitative Land Cover Sample Site Protocol



Purpose

To observe a Qualitative Land Cover Sample Site and collect the appropriate field data necessary for completing a land cover map from manual interpretation or unsupervised classification and for validating or assessing the accuracy of a land cover map

Overview

Qualitative field data are collected for a minimum of one Land Cover Sample Site for each land cover class in the GLOBE Study Site for which quantitative field data are not collected.

Time

20 - 45 minutes (excluding travel time)

Level

All

Frequency

Only need to collect data once for each Land Cover Sample Site

Multiple Land Cover Sample Sites are desired.

Key Concepts

- Land cover map
- Land cover classification
- GPS
- Field measurements

Skills

Locating a field plot (Land Cover Sample)

Using of GPS

Using field instrumentation (compass, tubular densiometer, clinometer)

Determining pace

Materials and Tools

Natural color, hard-copy TM image of your 15 km x 15 km GLOBE Study Site

Color infrared, hard-copy TM image of your 15 km x 15 km GLOBE Study Site

Compass

Tubular densiometer

Clinometer

GPS unit

Field form

Camera

MUC classification system and definitions

Preparation

None

Prerequisites

Leaf Classification Learning Activity

Introduction

The objective of collecting qualitative training and validation data is to familiarize the students with the entire GLOBE Study Site and identify the major land cover types present. These data can be collected rather quickly and efficiently, taking photos, using the GPS receiver to measure the location of the center of the site, and classifying the land cover using the MUC system. Qualitative training data can be used to label the unknown clusters resulting from unsupervised classification

or as training areas for supervised classification. Data for additional Qualitative Land Cover Sample Sites can be used to determine the validity of your land cover map. It is anticipated that most schools will use this protocol many times to provide sufficient samples to perform a valid accuracy assessment of their land cover map. See the *Accuracy Assessment Protocol*.

How to Collect Qualitative Land Cover Sample Site Data

Step 1: Selecting and Locating Land Cover Sample Sites

- ☐ Select as your Land Cover Sample Site a 90 m x 90 m area of homogeneous land cover using either the TM image of your GLOBE Study Site or your observations in the field.
- ☐ Using the TM image for orientation, carefully locate and travel to the Land Cover Sample Site on the ground.
- ☐ Locate and carefully mark the center of the site with a temporary marker.

Step 2: GPS Location

- ☐ Obtain a Global Positioning System (GPS) unit. If you do not have the GPS unit when establishing a Land Cover Sample, make sure the center is clearly and durably marked and then come back and record the coordinates when you obtain a GPS unit.
- ☐ Perform the *GPS* or *Offset GPS Protocols* to determine the longitude, latitude, and elevation of the center of the Land Cover Sample Site. See the *GPS Investigation*.
- ☐ Record these data on the appropriate GPS Data Work Sheet and note the average latitude, longitude and elevation calculated on the Land Cover/Biology Investigation Field Data Work Sheet.

Step 3: Photos

- ☐ From the center of the site, take a photo in each of the four cardinal directions (N, S, E, W).
- ☐ Have two sets of prints developed or print out your digital photo.
- ☐ Label each photo with Land Cover Sample Site name and directional aspect.
- ☐ Retain one print or a copy of the digital photo for your school and send to GLOBE one print of each photo or a copy of the files for your digital photos.

Step 4: Determine MUC Class

- ☐ Perform the *MUC Protocol* to determine the MUC class. See helpful hints: *Pacing*, *Compass*.
- ☐ Record the MUC class on the Field Data Work Sheet.

Step 5: Report Data

- ☐ Review the data work sheets and record data in the school's permanent local data record.
- ☐ Report the data to GLOBE using the Qualitative Land Cover Sample Site Data Entry Sheet.
- ☐ Send copies of photos to the GLOBE Student Data Archive.



Helpful Hints: Pacing

Scientists, foresters, and others use pacing and compass bearings in conjunction with aerial photographs, maps or written instructions to find specific ground locations. As a convenience, many people who do field work determine how many of their paces it takes to travel a short set distance and use this to measure longer overall distances.



Pacing is specifically used in the MUC System and Qualitative and Quantitative Land Cover Sample Site Protocols to determine sampling points at which to take observations of ground cover and canopy cover. Methods for determining the length of one pace and the number of paces required to travel a set distance (called a *unit*) are discussed below.

Method for Determining the Length of One Pace

Step 1:

Lay out a 30 meter or longer measuring tape on a flat, open area (a parking lot, field, or hallway is good).

Step 2:

Remember that *one pace is two steps*. Starting with your toe at the 0 meter mark, pace off 10 paces, using a normal stride. It is important to use a normal, comfortable stride because of the wide variety of conditions encountered in the field.

Step 3:

Note the marking on the tape where your toe is on the tenth pace.

Step 4:

Divide that value by 10 to find the length of your pace.

Step 5:

Repeat this measurement three times and calculate the average to determine your average pace.

Example:

Repetition Number	Distance of 10 Paces	Distance of Single Pace
1	17.0 m	1.70 m
2	17.5 m	1.75 m
3	16.8 m	1.68 m
Average Pace = 1.71 meters per pace		



What To Do When in the Field

Pacing in the woods or over hilly terrain is quite different than pacing a flat distance in a school yard or parking area. Remember the following tips:

- When initially measuring your pace, be sure to walk using a comfortable stride. Resist the temptation to take exaggerated steps because your pace will naturally become shorter in the woods or over hilly terrain.
- When pacing up or down a hill, you are actually traveling a shorter horizontal distance than it seems, and you may also pace irregularly due to the terrain. Be aware of your paces and compensate by taking slightly shorter or longer steps as necessary.
- When large objects (boulders, large trees, etc.) are in the way, take a lateral side step, pace forward, then take another lateral side step back to your original compass bearing. If an observation is required while side-stepping and pacing around an obstacle, then estimate the reading from the side-stepped position.

If an object is too large to conveniently side step, leave a visible marker to find your place and walk all the way around. Start counting again at the marker on the other side of the object.



Method for Determining the Number of Paces Required to Travel One Unit

In the MUC, Qualitative, and Quantitative Protocols students are required to collect canopy and ground cover data for a distance of 1 unit = 21.2 meters from the center of the Land Cover Sample Site. This distance was chosen because it is half the diagonal of a 30 m x 30 m pixel.

Step 1:

Measure a distance of 21.2 meters out on a flat, open area (a parking lot, field, or hallway is good).

Step 2:

Remember that *one* pace is *two* steps. Starting with your toe at the 0 meter mark count the number of paces required to travel the entire distance using a normal stride.

Step 3:

Repeat this measurement three times and calculate the average to determine an average number of paces.

Step 4:

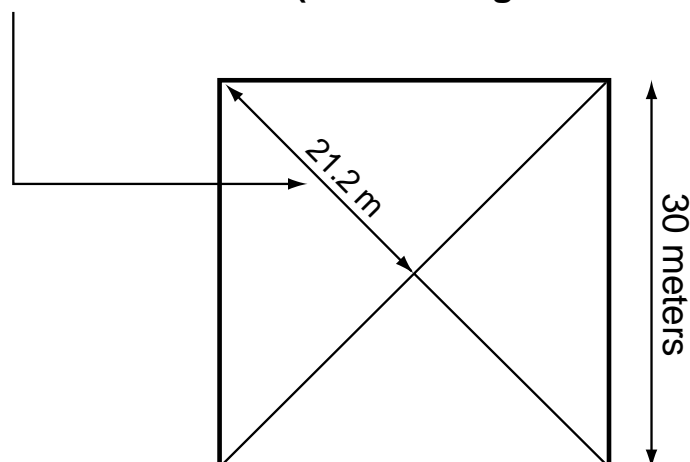
Round the number of paces to the nearest half pace.

Step 5:

Record each individual's pace so it can be referred to when collecting data at a land cover sample site.

Figure LAND-P-6: Pacing Example

1 unit = 21.2 meters (half the diagonal of a 30m x 30 m pixel)



Helpful Hints: Compass

The magnetic needle in a compass is attracted by the magnetism of the Earth, and that is why it always points North. However, there are really two North Poles on the Earth. One is the *True North Pole* which is located geographically at the top of the earth (at 90° North latitude); and the other is the *Magnetic North Pole*, an area of highly magnetic rock under central Canada.

Maps and directions are based on True North while the compass needle points to Magnetic North. Magnetic declination is the angle between True North and Magnetic North. Its size and direction depends on where you are on the Earth. It is necessary to determine the declination to take accurate compass bearings. Compasses either have a mechanism to set the angle of declination or a scale to determine declination.

Because compasses are attracted to metal objects they will give incorrect readings if the user is close to, or wearing, metal objects including watches, keys, etc.

Three Basic Parts of the Compass

1. The *magnetic needle* (See A in the Figure LAND-P-7) is attracted by the magnetic North Pole of the earth. The magnetic end (black) always points to magnetic north
2. The *graduated dial* (B) is used to set the desired bearing. The bearing is read in degrees at the sighting arrow (C) at the top of the compass. The dial is graduated in 2 degree increments from 0 to 360 degrees. The cardinal directions are at 0 (or 360), 90 degrees, 180 degrees and 270 degrees which correspond to North, East, South and West.
3. The *base plate* (D) has an orienting arrow (E) and a sighting arrow (C). Some models also have mirror sights attached. These components are used to line up the magnetic needle and point out the “line of travel”.

Setting Compass Bearings

Step 1:

Set the dial (B) to the desired degree reading (the direction in which you want to travel) so that the correct compass bearing lines up with the sighting arrow (C).

Step 2:

While holding the compass level, turn your body until the red end of the magnetic needle (A) lines up with the red orienting arrow (E). “Put the red in the shed” is a useful saying to help students remember what to do. The red orienting arrow is considered the “shed.”

Step 3:

Your direction or objective will now lie straight ahead in the direction you are holding the compass (the direction in which the sighting arrow points).

Be sure to choose an object ahead of you in line with your compass bearing and walk toward it. This allows you to walk without looking down at your compass. Every few paces stop and check that you are still traveling in the desired compass direction.

Figure LAND-P-7: Compass Example

